Citation:

Nagata C. Ecological study of the association between soy product intake and mortality from cancer and heart disease in Japan. *Int J Epidemiol.* 2000 Oct;29(5):832-6.

PubMed ID: 11034965

Study Design:

Longitudinal study

Class:

C - Click here for explanation of classification scheme.

Research Design and Implementation Rating:

NEUTRAL: See Research Design and Implementation Criteria Checklist below.

Research Purpose:

To examine ecological correlations between soy product intake and mortality rates from several types of cancer and heart disease in Japan.

Inclusion Criteria:

- Participants of the Special Report on Vital Statistics and Population Census of Japan in 1995
- National Nutritional Survey reports between 1980 and 1985
- Located in 12 geographical districts covering 47 prefectures

Exclusion Criteria:

- Were not participants of the Special Report on Vital Statistics and Population Census of Japan in 1995
- Were not participants of the National Nutritional Survey reports between 1980 and 1985

Description of Study Protocol:

Recruitment

Morbidity data were taken from the Report on Vital Statistics and Population census of Japan in 1995 and nutrient intake data were taken from the National Nutritional Survey reports.

Design: Longitudinal study

- Morbidity data on stomach, colorectal, lung, breast (female only) and prostate cancers were taken.
- Nutrient data for total energy and intake of soy products and isoflavones were taken.

Blinding used (if applicable): not applicable

Intervention (if applicable): not applicable

Statistical Analysis

- The associations between soy product intake and mortality rates were assessed by Pearson correlations coefficients weighted by a factor proportional to the square root of population of each prefecture.
- Mean age, proportion of smokers, income index, total fertility rate, age at first marriage, education level, number of hospitals, proportion of one-persons households and distribution of three broad industry groups were used as covariates.

Data Collection Summary:

Timing of Measurements: not applicable

Dependent Variables

- Morbidity data on stomach, colorectal, lung, breast (female only) and prostate cancers were taken.
- Morbidity data were taken from the Special Report on Vital Statistics and Population census of Japan in 1995.

Independent Variables

- Nutrient intake data were taken from the Nutritional Survey reports between 1980 and 1985.
- Nutrient data for total energy and intake of soy products and isoflavones were taken.

Control Variables

- Mean age
- Proportion of smokers
- Income index
- Total fertility rate
- Age at first marriage
- Education level
- Number of hospitals
- Proportion of one-person households
- Distribution of three broad industry groups

Description of Actual Data Sample:

Initial N: 6000 randomly selected households

Attrition (final N): 6000 households

Age: not reported

Ethnicity: not reported

Other relevant demographics

Anthropometrics

Location: 12 geographical districts covering 47 prefectures of Japan.

Summary of Results:

Key Findings:

- Soy protein intake was significantly correlated with stomach cancer mortality rate in men after controlling for total energy, alcohol and salt intake, and the mean age and proportion of current smokers in the prefecture (r = -0.31, P = 0.04).
- Stomach cancer mortality rate in men was significantly (*P* =0.03) inversely correlated with total amount of soy products and marginally (*P* = 0.06) inversely correlated with isoflavone intake.
- Significant positive correlations were observed between colorectal cancer mortality rates and soy product intake (total amount as well as isoflavone intake) in men and women after controlling for mean age, total energy, proportion of current smokers and animal fat and alcohol intake.
- Soy product intake estimated as total amount as well as isoflavone and soy protein intake were significantly positively correlated with colorectal cancer mortality rates in both sexes (for total amount, r = 0.32, P = 0.03 in men and r = 0.44, P = 0.001 in women) after controlling for covariates.
- The inverse correlation of heart disease mortality rate with total amount of soy products and soy protein intake remained statistically significant after controlling for covariates in women (r = –0.32, *P* = 0.04, and r = –0.31, *P* = 0.045, respectively) but not in men.

Pearson correlation coefficients between soy product intake and mortality rates from various types of cancer.

Crude			Adjusted[a]		
Total amount	Isoflavone[b]	Soy protein	Total amount	Isoflavone	Soy protein
–0.32*	–0.28	–0.24	–0.28	–0.27	–0.31*
–0.28	–0.30*	–0.25	–0.15	–0.13	–0.10
–0.08	0.04	0.06	0.32*	0.32*	0.36*
–0.004	0.10	0.12	0.44**	0.51**	0.51**
–0.23	–0.35*	–0.31*	0.05	–0.15	–0.06
–0.39**	–0.44**	–0.42**	0.05	–0.12	–0.04
–0.32*	–0.22	–0.23	–0.01	–0.09	–0.08
0.41**	0.46**	0.44**	0.20	0.24	0.19

aAdjusted for the following variables: Stomach cancer: the mean age, proportion of current smokers and intake of alcohol and salt; Colorectal cancer: the mean age, proportion of current smokers, and intake of alcohol and animal fat; Lung cancer: the mean age and proportion of current smokers; Prostate cancer: the mean age, proportion of current smokers and alcohol intake; Breast cancer: the mean age and total fertility rate. Amount of soy products as well as isoflavone intake are adjusted for total energy.

bGenistein plus daidzein.

Statistically significant: *$P < 0.05$; **$P < 0.01$.

Pearsons correlation coefficients between soy product intake and mortality rates from heart diseases.

Crude			**Adjusted[a]**	
Total amount	Isoflavone[b]	Soy protein	Total amount	Isoflavone
–0.32*	–0.27	–0.25	–0.08	–0.03
–0.57**	–0.52**	–0.48**	–0.32*	–0.31*

aMale: adjusted for the mean age, percentage of population with first industry, proportion of current smokers and intake of animal fat and salt; female: adjusted for the mean age, percentage of population with first industry, proportion of current smokers and intake of salt. Amount of soy products and soy protein are adjusted for total energy.

bGenistein plus daidzein.

Statistically significant: *$P < 0.05$; **$P < 0.01$.

Author Conclusion:

The present study provides modest support for the preventive role of soy against stomach cancer

and heart disease death. The study emphasizes that the associations of soy product intake with stomach cancer and heart disease should be evaluated using various study designs including the full range of soy products.

Reviewer Comments:

Author notes that sample selection in the nutritional survey was based on household units and information on the participants' characteristics such as age, sex, and family were not available, which could have biased some of the results.

Research Design and Implementation Criteria Checklist: Primary Research

Relevance Questions		
1.	Would implementing the studied intervention or procedure (if found successful) result in improved outcomes for the patients/clients/population group? (Not Applicable for some epidemiological studies)	Yes
2.	Did the authors study an outcome (dependent variable) or topic that the patients/clients/population group would care about?	Yes
3.	Is the focus of the intervention or procedure (independent variable) or topic of study a common issue of concern to nutrition or dietetics practice?	Yes
4.	Is the intervention or procedure feasible? (NA for some epidemiological studies)	Yes

Validity Questions		
1.	**Was the research question clearly stated?**	Yes
1.1.	Was (were) the specific intervention(s) or procedure(s) [independent variable(s)] identified?	Yes
1.2.	Was (were) the outcome(s) [dependent variable(s)] clearly indicated?	Yes
1.3.	Were the target population and setting specified?	Yes
2.	**Was the selection of study subjects/patients free from bias?**	Yes
2.1.	Were inclusion/exclusion criteria specified (e.g., risk, point in disease progression, diagnostic or prognosis criteria), and with sufficient detail and without omitting criteria critical to the study?	Yes
2.2.	Were criteria applied equally to all study groups?	Yes
2.3.	Were health, demographics, and other characteristics of subjects described?	No

2.4.	Were the subjects/patients a representative sample of the relevant population?	Yes
3.	**Were study groups comparable?**	N/A
3.1.	Was the method of assigning subjects/patients to groups described and unbiased? (Method of randomization identified if RCT)	N/A
3.2.	Were distribution of disease status, prognostic factors, and other factors (e.g., demographics) similar across study groups at baseline?	N/A
3.3.	Were concurrent controls used? (Concurrent preferred over historical controls.)	N/A
3.4.	If cohort study or cross-sectional study, were groups comparable on important confounding factors and/or were preexisting differences accounted for by using appropriate adjustments in statistical analysis?	N/A
3.5.	If case control or cross-sectional study, were potential confounding factors comparable for cases and controls? (If case series or trial with subjects serving as own control, this criterion is not applicable. Criterion may not be applicable in some cross-sectional studies.)	N/A
3.6.	If diagnostic test, was there an independent blind comparison with an appropriate reference standard (e.g., "gold standard")?	N/A
4.	**Was method of handling withdrawals described?**	N/A
4.1.	Were follow-up methods described and the same for all groups?	N/A
4.2.	Was the number, characteristics of withdrawals (i.e., dropouts, lost to follow up, attrition rate) and/or response rate (cross-sectional studies) described for each group? (Follow up goal for a strong study is 80%.)	N/A
4.3.	Were all enrolled subjects/patients (in the original sample) accounted for?	Yes
4.4.	Were reasons for withdrawals similar across groups?	N/A
4.5.	If diagnostic test, was decision to perform reference test not dependent on results of test under study?	N/A
5.	**Was blinding used to prevent introduction of bias?**	Yes
5.1.	In intervention study, were subjects, clinicians/practitioners, and investigators blinded to treatment group, as appropriate?	N/A
5.2.	Were data collectors blinded for outcomes assessment? (If outcome is measured using an objective test, such as a lab value, this criterion is assumed to be met.)	Yes
5.3.	In cohort study or cross-sectional study, were measurements of outcomes and risk factors blinded?	N/A

5.4.	In case control study, was case definition explicit and case ascertainment not influenced by exposure status?	N/A
5.5.	In diagnostic study, were test results blinded to patient history and other test results?	N/A
6.	**Were intervention/therapeutic regimens/exposure factor or procedure and any comparison(s) described in detail? Were interveningfactors described?**	Yes
6.1.	In RCT or other intervention trial, were protocols described for all regimens studied?	N/A
6.2.	In observational study, were interventions, study settings, and clinicians/provider described?	Yes
6.3.	Was the intensity and duration of the intervention or exposure factor sufficient to produce a meaningful effect?	Yes
6.4.	Was the amount of exposure and, if relevant, subject/patient compliance measured?	N/A
6.5.	Were co-interventions (e.g., ancillary treatments, other therapies) described?	N/A
6.6.	Were extra or unplanned treatments described?	N/A
6.7.	Was the information for 6.4, 6.5, and 6.6 assessed the same way for all groups?	Yes
6.8.	In diagnostic study, were details of test administration and replication sufficient?	N/A
7.	**Were outcomes clearly defined and the measurements valid and reliable?**	Yes
7.1.	Were primary and secondary endpoints described and relevant to the question?	Yes
7.2.	Were nutrition measures appropriate to question and outcomes of concern?	Yes
7.3.	Was the period of follow-up long enough for important outcome(s) to occur?	Yes
7.4.	Were the observations and measurements based on standard, valid, and reliable data collection instruments/tests/procedures?	Yes
7.5.	Was the measurement of effect at an appropriate level of precision?	Yes
7.6.	Were other factors accounted for (measured) that could affect outcomes?	Yes
7.7.	Were the measurements conducted consistently across groups?	Yes
8.	**Was the statistical analysis appropriate for the study design and type of outcome indicators?**	Yes
8.1.	Were statistical analyses adequately described and the results reported appropriately?	Yes

	8.2.	Were correct statistical tests used and assumptions of test not violated?	Yes
	8.3.	Were statistics reported with levels of significance and/or confidence intervals?	Yes
	8.4.	Was "intent to treat" analysis of outcomes done (and as appropriate, was there an analysis of outcomes for those maximally exposed or a dose-response analysis)?	N/A
	8.5.	Were adequate adjustments made for effects of confounding factors that might have affected the outcomes (e.g., multivariate analyses)?	Yes
	8.6.	Was clinical significance as well as statistical significance reported?	Yes
	8.7.	If negative findings, was a power calculation reported to address type 2 error?	No
9.	**Are conclusions supported by results with biases and limitations taken into consideration?**		Yes
	9.1.	Is there a discussion of findings?	Yes
	9.2.	Are biases and study limitations identified and discussed?	Yes
10.	**Is bias due to study's funding or sponsorship unlikely?**		Yes
	10.1.	Were sources of funding and investigators' affiliations described?	Yes
	10.2.	Was the study free from apparent conflict of interest?	Yes